REMARKS

The Official Action of November 29, 2005, and the prior art relied upon therein have been carefully reviewed. The claims in the application remain as claims 18-32, and these claims define patentable subject matter warranting their allowance. Accordingly, the applicants respectfully request favorable reconsideration and allowance.

Acknowledgement by the PTO of the receipt of applicants' papers filed under Section 119 is noted.

Claims 18-32 have been rejected as obvious under Section 103 from Harada et al JP 2000-345314 (Harada) in view of Herbst-Dederichs 2004/0069141 (Herbst-Dederichs). This rejection is respectfully traversed.

First, applicants respectfully question whether or not Herbst-Dederichs is "prior art" against applicants' invention. Thus, the present application is the National Phase of PCT/JP 2003/013192 filed October 15, 2003, prior to the publication date of Herbst-Dederichs; and, moreover, the present application is entitled to the Japanese priority date of 2002-300772 filed **October 15, 2002**.

Applicants recognize that Herbst-Dederichs is based on a PCT application filed November 17, 2001, but applicants are unaware that such PCT application **was filed in English**, or **when**

an English translation thereof was filed in the PTO.

Clarification is respectfully requested.

However, even if Herbst-Dederichs is "prior art" to the present application, applicants' claims still define not only novel subject matter (acknowledged by the combination rejection), but also non-obvious subject matter.

The rejection acknowledges that even if Herbst-Dederichs were prior art, and even if it would have been obvious to modify Harada in view of Herbst-Dederichs as proposed in the rejection, applicants' claims would still not be reached. Thus, in the second paragraph on page 3 of the rejection, the PTO acknowledges that the proposed combination does not reach the claimed subject matter of a coated piston combined with a cylinder liner of cast iron, and no prior art is cited or applied in this regard.

In the third paragraph on page 3, the PTO acknowledges that the recitation of the tensile strength of the liner being less than 300 MPa is not reached by the proposed combination, and no prior art has been cited to show this feature.

In these two regards, the rejection does not meet the fundamental requirements for a *prima facie* obviousness rejection as summarized in MPEP 2143, and particularly the last sentence of the first paragraph thereof which explicitly states that "the prior art reference (or references when combined) must teach or suggest ***all*** the claim limitations." (Emphasis added).

Further in this regard, the rejection in the regard as traversed immediately above seems to fly in the face of the law as stated in *Ex parte Levengood*, 28 USPQ 2d 1300, 1301-1302 (BPAI 1993) where the Board stated:

> At best, the Examiner's comments regarding obviousness amount to an assertion that one or ordinary skill in the relevant art would have been able to arrive at appellant's invention because he had the necessary skills to carry out the requisite process steps. This is an inappropriate standard for obviousness. [citation omitted]. That which is within the capabilities of one skilled in the art is not synonymous with obviousness. [citations omitted].

Respectfully, applicants cannot accept a statement that something is obvious without seeing the evidence, i.e. applicants cannot accept what is in effect official notice of the existence of prior knowledge which applicants have not seen. Applicants deserve the right to face any prior art which might exist, and thus have the opportunity to rebut such prior art.

Then, in the paragraphs spanning pages 3 and 4 of the Official Action, the rejection acknowledges that the proposed combination does not expressly meet yet another feature of the claimed invention. In this case, the rejection states what might be "reasonable to expect", but applicants do not understand that this means that it would have been obvious to provide the claimed piston ring having the recited pore diameter and porosity as recited. Perhaps the rejection in this regard is relying on the proposed combination **inherently** providing the recited pore

diameter, although that is not stated. If indeed inherency is relied upon, applicants strongly traverse such a conclusion. The law is clear that, as appears from *In re Brink*, 164 USPQ 247, 249, that

> Absent a showing [by the PTO] of some reasonable certainty of inherency, the rejection... under 35 USC 102 must fail.

See also *Ex parte Cyba*, 155 USPQ 756, 757 (1967); and *In re Oelrich*, 212 USPQ 323, 326 (1981); inherency must be "certain" or "inevitable". It is not reasonably certain or inevitable that the proposed combination, even if proper, would result in the recited pore diameter.

The above points apply to all of applicants' claims which define non-obvious subject matter simply because the proposed combination, even if obvious (not conceded by applicants) would not reach the subject matter called for in applicants' claims because the citations do not provide **evidence** that all features claimed were known and would have been obviously combined. Applicants again rely on *Ex parte Levengood*, *supra*, where the Board emphasized the necessity for evidence:

> In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present ***evidence***, [footnote and citations omitted] preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge... . [citations omitted; italics in original]

There are many prior decisions which emphasize that no recitation in an applicant's claims should be ignored. Please note *In re Glass*, 176 USPQ 489, 491 (CCPA 1973), where the court stated:

> It is error to ignore specific limitations distinguishing over the references.

Please also see *In re Echerd et al*, 176 USPQ 321, 322 (CCPA 1973), where the court indicated that "potentially distinguishing features cannot simply be ignored."

In addition to the acknowledged deficiencies in the proposed combination, applicants wish to particularly emphasize the feature of the present invention that the thermal spray coating comprises chromium carbide particles having an average particle size of 5 μm or less dispersed in a matrix metal composed of a Ni-Cr alloy or a Ni-Cr alloy and Ni. Thus, the thermal spray coating of claim 18 corresponds to a first thermal spray coating formed by **a composite powder** comprising chromium carbide particles having an average particle size of 5 μm or less dispersed in a matrix metal composed of a Ni-Cr alloy or a Ni-Cr alloy and Ni, both being strongly and chemically stably bonded to each other using a velocity oxygen fuel (**HVOF**) spraying method or a high-velocity air fuel (**HVAF**) spraying method (see page 5, lines 21-23 of applicants' specification).

The chemically stable, strong bonding between chromium carbide particles and a Ni-Cr alloy (or a Ni-Cr alloy and Ni) is preferable to prevent the coarsening or melting of the Ni-Cr

alloy by the chromium carbide particles (see page 12, line 23 to page 13, line 3 of applicants' specification).

Further, it is necessary that the first spray coating of the piston ring of claim 18 has an average pore diameter of 10 μm or less and a porosity of 8% or less by volume per the entire thermal spray coating. This is because when the average diameter of pores exceeds 10 μm, or when the porosity exceeds 8% by volume, pores function as sites, at which chromium carbide particles debond from the coating, during sliding (see page 9, lines 10-15 of applicants' specification).

In contrast to the claimed invention, Harada discloses a high degree-of-hardness carbide cermet-sprayed coat covering member coated on the surface of a heat-resistant metal base with the carbide cermet-spraying coating (layer) composed of 95-50wt% chromium carbide, and 5-50wt% of nickel and/or any 1 or more sorts of carbide formation metals chosen from Cr, Ta, Ti, W, Mo and Nb using a **high-speed flame-spraying method** and having coat properties: a porosity of less than 1.20% and an average hardness Hv of 1000 or more (see claim 1; sections [0010], [0011] and [0015]; and tables 1-4 in Harada), thereby providing a high degree-of-hardness carbide cermet-spraying coat covering member excellent in abrasion resistance suitable for use under the environment where thermal resistance and erosion-proof nature are required, and useful for reduction of labor, reduction of maintenance control expense, and improvement in productivity (see

sections [0001] and [0035] of Harada), the features of which are importantly different from the claimed invention as mentioned above, that is wherein the thermal spray coating does not comprise chromium carbide particles having an average particle size of 5 μm or less dispersed in a matrix metal composed of a Ni-Cr alloy or a Ni-Cr alloy and Ni.

Therefore, those skilled in the are referring to Harada, which does not teach or suggest applicants' coating, would not reach the invention of claim 18, and, accordingly, claim 18 of the present application would not have been obvious from Harada alone, as implied by the combination rejection.

To overcome this acknowledged deficiency of Harada, the PTO has relied on Herbst-Dederichs (which may or may not be "prior art"). But even if Herbst-Dederichs is prior art, the proposed combination would not have been obvious because it flies in the face of the requirements of Harada. In this regard, the person of ordinary skill in the art, wishing to follow Harada, would not depart from the requirements of Harada and use instead what is taught by Herbst-Dederichs, which namely includes at least the high-speed flame-spraying application. To do otherwise would be to fly in the face of Harada, the very antithesis of obviousness.

Moreover, even if it were obvious to modify Harada in view of Herbst-Dederichs, contrary to applicants' position, the coating in question would still not be achieved. In this regard,

Herbst-Dederichs discloses a protective layer for piston rings in internal combustion machines, essentially consisting of **chromium carbides**, tungsten carbide, **chromium and nickel**, whereby the protective layer against wear and tear is formed of a powder mixture in which the first powder exists as agglomerated and sintered powder made out of at least the alloy components **chromium carbide, chromium and nickel**, which has not experienced any subsequent embrittling heat treatment such as e.g. a plasma age hardening. As a result, the carbides in the powder have a mean diameter that is essentially not greater than 3 μm.

Also, a second powder that is also present as an agglomerated and sintered powder, and containing tungsten carbide as an essential characteristic is applied to at least one area of the piston rings by thermal spraying, so that two different areas are produced in Herbst-Dederichs in the protective layer against wear and tear, whereby a first area develops that is primarily rich in chromium carbide and a second area develops that is chiefly rich in tungsten carbide (see Abstract; and section [0006] of Herbst-Dederichs) the features of which are importantly different from those of the claimed invention in not teaching at least thermal spray coating comprising chromium carbide particles having an average particle size of 5 μm or less **dispersed** in a matrix metal composed of an Ni-Cr alloy or a Ni-Cr alloy and Ni in a first area and in having a second area that is chiefly in

tungsten carbide, which is not indispensably used in the claimed invention, in the protective layer thereof.

Therefore, those skilled in the art referring to Harada and Herbst-Dederichs, which do not teach or suggest at least the aforementioned feature of the claimed invention, would not reach the features of claim 18, and, accordingly, claim 18 of the present application would not have been obvious from Harada in view of Herbst-Dederichs.

As is clear from the foregoing, neither Harada and Herbst-Dederichs, taken alone or in combination, teaches or suggests least the aforementioned coating feature of the claimed invention, and thus the amended claim 18 of the present application would not have been obvious from Harada even if obviously combined with Herbst-Dederichs.

With respect to claim 19, 24-28 and 30-32, their patentability is clear at least by virtue of the basis of their dependency from the amended claim 18.

Claim 20 of the present application calls for a piston ring comprising a thermal spray coating at least on an outer peripheral surface, which is combined with a cylinder liner of cast iron having a tensile strength of 300 MPa or less, said thermal spray coating comprising a first phase having chromium carbide particles dispersed in a matrix metal composed of a Ni-Cr alloy or a Ni-Cr alloy and Ni, and a second phase composed of at least one metal selected from the group consisting of Fe, Mo, Ni,

Co and Cu or an alloy containing said metal, said first phase existing more than said second phase.

That is, major distinguishing features of the invention as called for in claim 20 are found in that the thermal coating thereof, which corresponds to a second thermal spray coating of the present invention, comprises a first phase of the thermal spray coating of claim 18, and a second phase composed of at least one metal selected from the group consisting of Fe, Mo, Ni, Co, Cr and Cu or an alloy containing said metal, the first phase existing more than the second phase, and which has the same microstructure and properties as those of the first spray coating such as an average pore diameter of 10 μm or less and a porosity of 8% or less by volume per the entire thermal spray coating (see page 10, lines 8-13; and page 11, lines 8-12 of the specification).

Specifically, metals or alloys such as Fe, Mo, Ni, Co, Cr, Cu, a Ni-Cr alloy, a Ni-Al alloy, a Fe-Cr-Ni-Mo-Co alloy, a Cu-Al alloy, a Co-Mo-Cr alloy in the second phase in an area ratio of the first phase occupying the second thermal spray coating of 60% to 95% per the area (100%) of a portion of the thermal spray coating excluding pores (first phase + second phase) are softened and strongly adhered to the first phase when thermally sprayed by a HVOF method or a HVAF method, so that the metal or alloy powder in the second phase function as a binder for the composite powder, thereby increasing the bonding strength

of thermally sprayed powders (see page 10, line 24 to page 11 of the specification), about which both Harada and Herbst-Dederichs are silent.

Therefore, those skilled in the art referring to Harada and Herbst-Dederichs, which do not teach or suggest any second phase composed of at least one metal selected from the group consisting of Fe, Mo, Ni, Co, Cr and Cu or an alloy containing the metal as a binder for the composite powder, would not be able to obviously reach the invention as called for in claim 20, and, accordingly, claim 20 of the present application would not have been obvious from Harada and Herbst-Dederichs, taken alone or even in combination thereof.

With respect to claims 21-23 and 29 of the present application, their patentability is clear at least by virtue of the basis of their dependency from the amended claim 20.

The prior art does not make applicants claims obvious. Withdrawal of the rejection is in order and is respectfully requested.

The prior art documents of record and not relied upon by the PTO have been noted, along with the implication that such documents are deemed by the PTO to be insufficiently material to warrant their application against any of applicants' claims.

Applicants believe that all issues raised in the Office Action have been addressed above in a manner favorable to

allowance of the present application. Accordingly, applicants respectfully request favorable reconsideration and early formal allowance.

Respectfully submitted,

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